CM340 - CM440

SWITCHING POWER GENERATOR FOR 0.9 & 1.2 KW MAGNETRON

TECHNICAL NOTE

(issue March 2003)

alter® Power Systems

CE Declaration of Conformity
Dichiarazione di Conformità CE

Manufacturer's Name: *Nome del Costruttore:* ALTER s.r.l

Manufacturer's Address: *Indirizzo del Costruttore:* Via Curie, 8 - 42100 Reggio Emilia - Italy

Declare that the product: *Dichiara che il Prodotto:*

product name: *nome prodotto:* CM340 E, CM440 E (power supply), TMx10 and TMx12 (microwave generator head)

model: *modello:* CM340.xxx0, CM340.xxx1, CM440.xxx0, CM440.xxx1, TMx10.xxx0, TMx12.xxx0

complies with the following norms: *Soddisfa le seguenti norme*:

EN 61010-1: 1994 + A2: 1996 (EN 61010: 1993 + A2: 1995)
EN55011: 1991

The products listed above comply with the requirements of the Low Voltage Directive 73/23/EEC.
I Prodotti sopraindicati sono conformi con la Direttiva di Bassa Tensione 73/23/EEC

Reggio Emilia, September 2000.

Marco Garuti

Presidente C.d.A.

Rev.	Note di revisione	Data	File
0	*Prima emissione*	*Settembre 2000*	*CM340_r0*
1	*Aggiunto specifiche per CM 440*	*Giugno 2002*	*CM340_r1eng*
2	*Ondulazione, trafo fil, segnale riferim.*	*Marzo 2003*	*CM340_r2eng*
3			

Contents

C
CE Declaration 1
Cleaning 7
Component list 7

E
Environmental conditions 4
Equipment installation 4
Equipment ratings 3

G
General Description 3
General Information 2

H
How to order 9

L
LED meaning 4

O
Operating controls 4

P
Physical characteristics 4
Pin out of CONN. # 1 and 2 8

T
Technical assistance 9

W
Warnings 2

General Information

This equipment satisfies the European Standard EN 61010-1 (=CEI 66-5) (=IEC 1010-1) approved by CENELEC on 9/3/1993.

With reference to EN 61010-1 standard, note: this appliance must be installed and serviced only by qualified personnel.
The appliance must only be used by persons acquainted with the regulations covering the application.

Note about EMC regulation: the equipment described in this manual has been classified as industrial, scientific and medical (ISM) radio-frequency equipment and the related standard for the emission is EN55011 (title: Limits and methods of measurement of radio disturbance characteristics of ISM equipment.)

With reference to the EN55011 standard, this equipment is included into Group 2 (Microwave generators, Thyristor command equipment, Welding equipment, Induction heating equipment or machine, Microwave industrial oven, etc.), Class A (industrial environment): for this reason this equipment shall not be used in the residential, commercial and light-industrial environment.

The CMx40 and Tx010, when properly installed, complies with the limits of radio disturbance characteristic of a Group2, Class A equipment as stated by EN55011.

A copy of the tests performed may be sent on request. Note that these tests cannot be used as a conformity certificate of the user's final equipment.

WARNINGS

The CMx40E is powered by 230V main line and has high voltage output (close 4 kV): read carefully this manual before using.
Be sure of that the equipment is correctly connected as described below.
Failure to comply with the instructions enclosed in this manual may involve considerable risks for the staff responsible for checking and using the equipment, as well as the risk of general malfunctions of the equipment itself.

General Description

The CM 340 power supply is able to supply, from remote location, the current necessary for a 900 W magnetron, as the 2M107, 2M167 or equivalents, observing the specifications set by the electron tube manufacturer, while CM 440 is suitable for a 1250 watt magnetron, as the 2M137 or equivalent.
This constructional choice -separation between the power supply unit and the microwave head- allows great freedom in positioning, even at long distance, the microwave emitter head, thus simplifing installation and maintenance.
In this manual the term "CMx40" refers both the models (CM340 and CM440).
The "CM" switch-mode power supplies are suitable to control the magnetron power with better performances compared to conventional thyristor controlled power supplies and lower output ripple. Therefore the "CM" is not a low ripple.
In addition to powering magnetron, CMx40 generator also supplies power to magnetron cooling fan, it monitors magnetron temperature, carries out a number of monitoring processes independently, cuts off the power in case of malfunction and display the alarms by mean of LED as explained hereinafter.

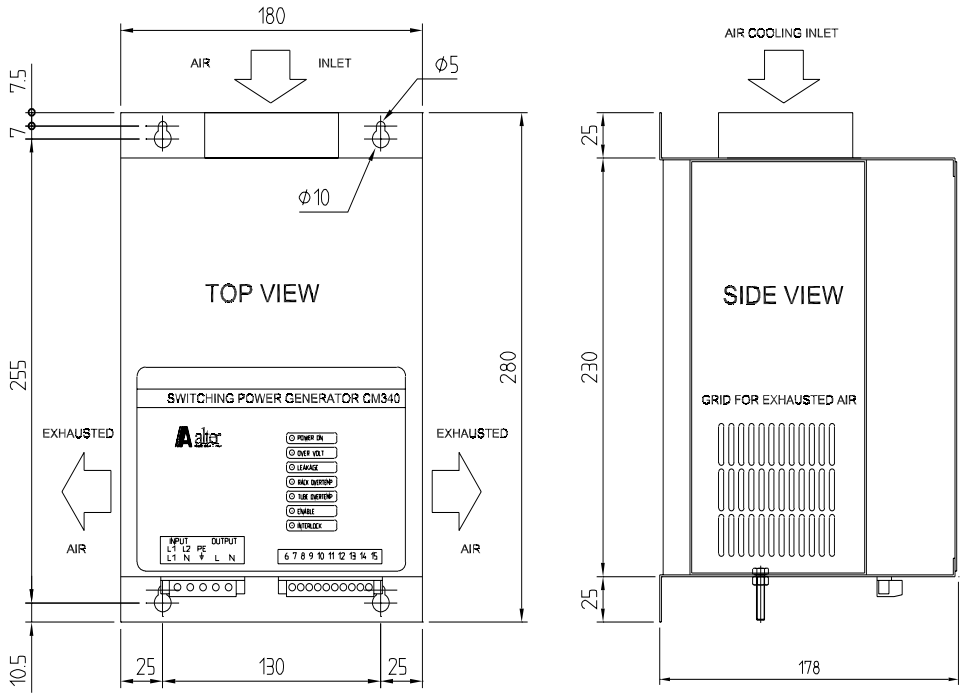
The output power can be adjusted from the outside on a continuous scale using an external analog signal: various options are available.

Equipment ratings

	CM340	**CM440**
Input voltage (nominal):	230 Vac	
Absolute max input voltage:	265 Vac	
Absolute min input voltage:	190 Vac	
Line frequency:	50/60 Hz	
Intake current (@230 Vac):	10.5 A	14A
Power factor:	0.66	
Output power:	1350 W	1850 W
Output current @ 40°C	350 mA	465 mA
Suggested magnetron type:	2M167	2M137
	2M107	
Filament preheating delay:	10 sec	
Suggested filament trafo type:	FIL35F	FIL65F
Remote control (ON/OFF enabling):	8-24Vdc, common to ground	
Analog reference signal:	0÷10V	
Measuring output current signal:	1V=100mA (Z=250Ω)	
Transient overvoltage:	overvoltage category II according IEC664	
Internal alarm contact:	Max 130V 1A	

Operation modes of the alarm contact:
a) power supply OFF: **open contact**
b) power supply ON, ok status: **closed contact**
c) power supply ON, alarm condition(s):**open contact**

Output stability: max 3% with +/-10% fluctuation of main line



Physical characteristics

Front panel size (w x h):	180 x178 mm
Equipment lenght:	280 mm
Minimum footprint on cabinet:	330 x 250 mm
Equipment weight:	4 kg (9 lbs)

Environmental condition

Use:	Indoor use only
Altitude:	tested up to 2,000 m (6,560 feet)
Temperature:	5°C to 40°C (41°F to 104°F)
Relative Humidity:	80% RH for temperature up 31°C (88°F), decreasing linearly to 50% RH at 40° (104°F)
Pollution degree:	2, according IEC664

Equipment installation

The CMx40 cannot operate on a bench: it must be installed into a proper closed cabinet, providing all the rules necessary to comply with the safety norms for the electrical equipment.
The equipment must be safely fixed inside a cabinet by means of screws on the base (which has 4 holes). We suggest a vertical installation on the internal supporting panel of a cabinet.
It shall be forbidden to make maintenance on the CMx40 while it's powered: provide safety rules like for any other power equipment installed inside an electrical cabinet. I.E.: if the door of the cabinet may be opened without any tool, then provide an interlock to shut-off at least the enabling signal or, even better, to remove main supply from the CMx40.
If you install several CMx40 inside the same cabinet then design the air cooling system considering the following:
- one CMx40 requires approx 70 m³/h,
- the air flow enters from the fan and exits by the side grids.

Equipment operation

Operating controls

The CMx40 operation is controlled by an external command at +24 Vdc (nominal): the voltage range may vary from 8 to 24 Vdc, common to ground, Z=10 kOhm. The command signal must be wired to pin 9 of the connector #2: if the user doesn't have a suitable voltage generator for this signal, then the equipment's internal voltage generator is available at pin 8 of connector #2. In this case, to enable the equipment operation, the user must provide an external contact closing the circuit between pin 8 and pin 9.
Refer to wiring diagram at page 8.

When the command is ON and the followings condition are satisfied:
- the CMx40 has been properly connected to a remote microwave head
- there are not alarms conditions
- the filament preheating has been completed, then

the CMx40 reach the preset value of anodic current and power-up the remote microwave head.

On the front panel there are the following LED indicators:

- 1 "ON" status green LED
- 4 alarms status red LEDs
- 1 enabling status blue LED
- 1 interlock status green LED

LED meaning:

POWER ON (green):	ON when the main line is present
OVERVOLT (red):	OFF: no alarm ON: anodic overvoltage > 5kV for period longer than 0.4 msec. This is a permanent alarm: to reset the alarm condition switch-off or disable the equipment.

LEAKAGE (red): OFF: no alarm
ON: current leakage detected, as the high voltage side dropped under 2 kV for period longer than 0.4 msec.
This is a permanent alarm: to reset the alarm condition switch-off or disable the equipment.

RACK OVERTEMP(red): OFF when no alarm is present.
ON for internal over temperature.
This is a permanent alarm: to reset the alarm condition switch-off or disable the equipment.

TUBE OVERTEM. (red): OFF for normal operation.
ON for magnetron overtemp. (or when the related connection is not grounded).
It is designed to work with a thermoswitch normally closed to ground.
This is a permanent alarm: to reset the alarm condition switch-off or disable the equipment.

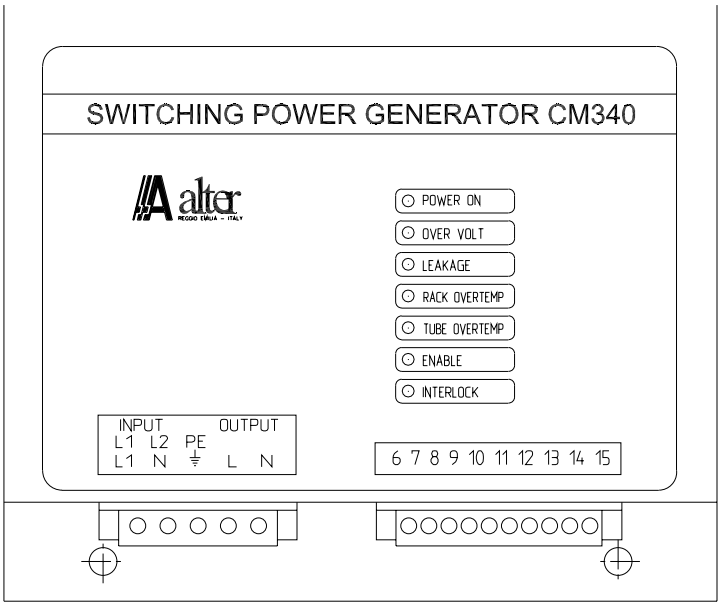
ENABLE (blue): OFF: output power is OFF.
ON: enabling signal is present: the equipment produces output power at the level set by reference signal.

INTERLOCK (green): OFF: the interlock circuit is open, the output power is OFF
ON: the interlock circuit is closed and the unit may power the microwave head.

Important note about alarms: **any alarm condition causes block of the equipment, which means no output power and opening of the alarm contact.**

Reset procedure: **remove the alarm cause, hold the enabling signal OFF for at least 3 seconds.**

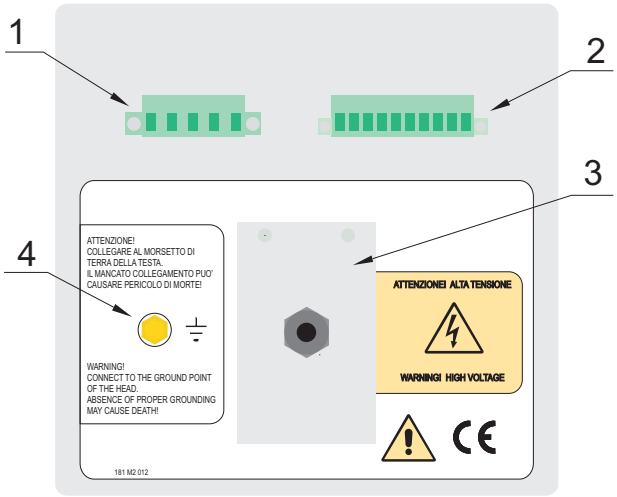
LED VIEW



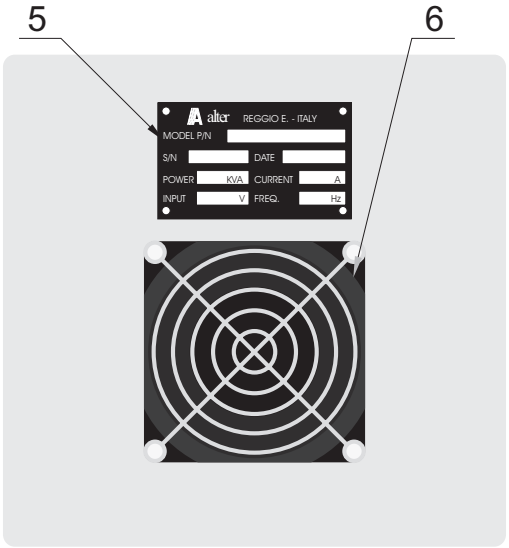
The top and bottom sides contain the following components (the number in brackets [ ] refers to drawing "Terminal board view-Fan view"):

- two MSTB types , Phoenix connectors, one with 5 pins (CONN. #1) [1] for the generator electrical power supply, the other with 10 pins (CONN. #2) [2] for signal
- a small cover [3] to access the High Voltage output on p.c.b. (by means of a faston) on the CMx40 standard version (ver. 0) or
- a H.V. connector -Y serie made by LEMO, bulkhead type- on CMx40 version 1
- a M5 screw [4] for direct ground connection of the magnetron's ground
- a label with the equipment's data [5]
- the cooling air intake grid and fan- [6]

TERMINAL BOARD VIEW



FAN VIEW



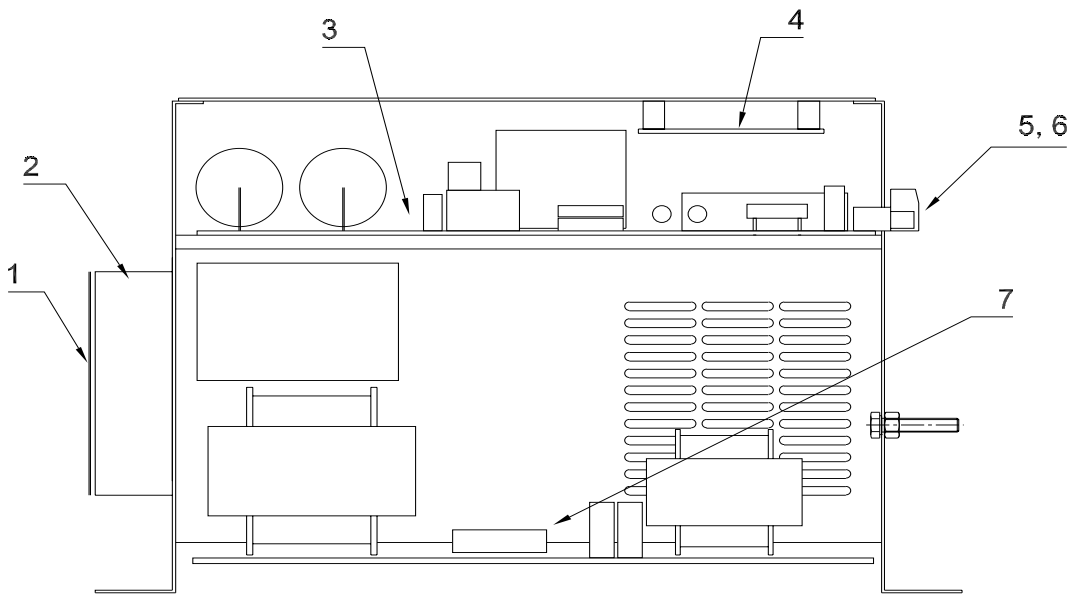
Equipment maintenance

Cleaning

Once a week inspect the inlet mesh of the cooling air as well as the outlet grid.
In case the equipment needs to be cleaned then proceed as follow:
- switch off the external circuit breaker or whatever device provided to remove the main from the equipment;
- remove the main connector #1 (5 pins)
- remove the cover
- remove dust with dry air
- reinstall cover: tighten all the screws
- plug the connector #1

Failure to comply with these instructions may involve considerable risks for the staff using the equipment, as well as the risk of malfunctions of the equipment itself.

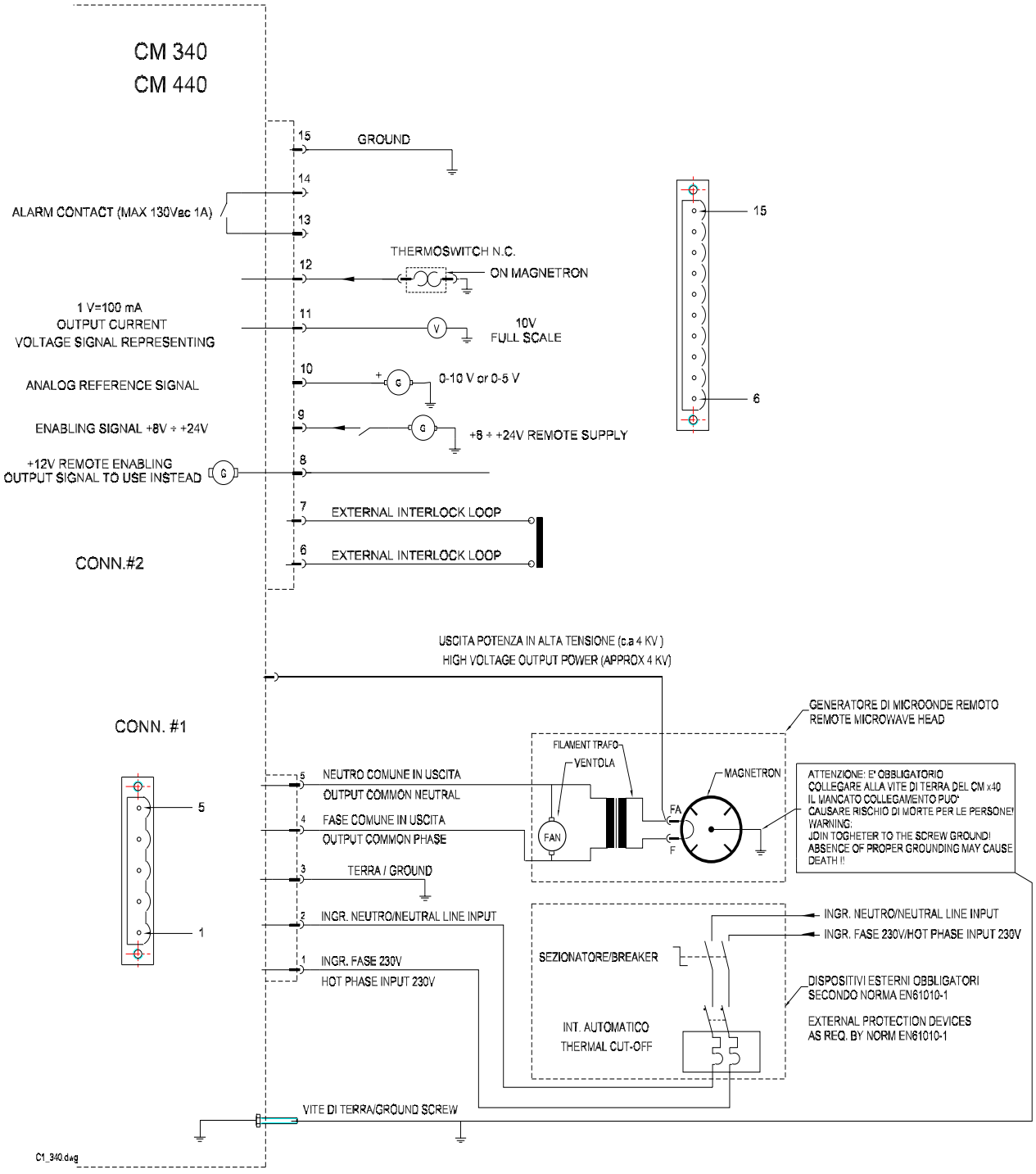
COMPONENTS LAYOUT



COMPONENT LIST

Pos	Q.ty	Description	P/N	Note
1	1	Grid	VELZ221	
2	1	Fan, dim. 80x80x25 mm	VE8412NGH	
3	1	Control board	800000270	
4	1	Display board	800000249	
5	1	5 pins, plug	MOPHOEN/1858798	CONN.#1
6	1	10 pins, plug	MOPHOEN/1778069	CONN.#2
7	1	H.V. board	800000271	

Pin out of CONN. # 1, 2



How to order

Power supplies: **CMx40Eb.yyyj**, where:

x (output current): 3 = 350 mA (900W magnetron)
4 = 465 mA (1250W magnetron)

b (bus type code): **0** or **nul**= no bus provided
C = **CANBUS** interface

yyy: the code used for a casto-mized unit

j (unit version): **0** or **nul**= standard version, no HV connector
1=version 1: has the HV Lemo connector (bulkhead type)

I.e.: CM340E = standard version without bus interface;
CM340E.1= version 1 with HV connector, no bus
CM340EC.1=version 1 with HV connector and CANBUS interface

Note: the power supply's package **does not include the plugs**: these must be ordered separately

Plugs set: p/n **44SET340**= for CMx40 vers. 0
p/n **44SET341**= for CMx40 vers. 1

Filament transformers: **FIL65F=** filament transformer for 2M137 magnetron and similar
FIL35F= filament transformer for 2M107 magnetron and similar

Microwave heads: **TM0x0.yyy0** = complete microwave head, includes the magnetron (air or water cooled version available)
See manual TM0-TMA

Cable set:
(Standard lenght 3 mt; other lengths available on request)

441384 340= full set for CMx40 version 0, includes the plugs on the p.s.u. side (no HV plug)

441384 341= full set for CMx40 version 1, includes the plugs on the p.s.u. side and also the HV plug.

441384 350= full set for CMx40 version 0, includes the plugs on the p.s.u. side (no HV plug) and plugs for TMx.

441384 351= full set for CMx40 version 1, includes the plugs, the HV plug on the p.s.u. side and plugs for TMx.

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Technical assistance

For technical assistance as well as spare parts contact your closest distributor or:

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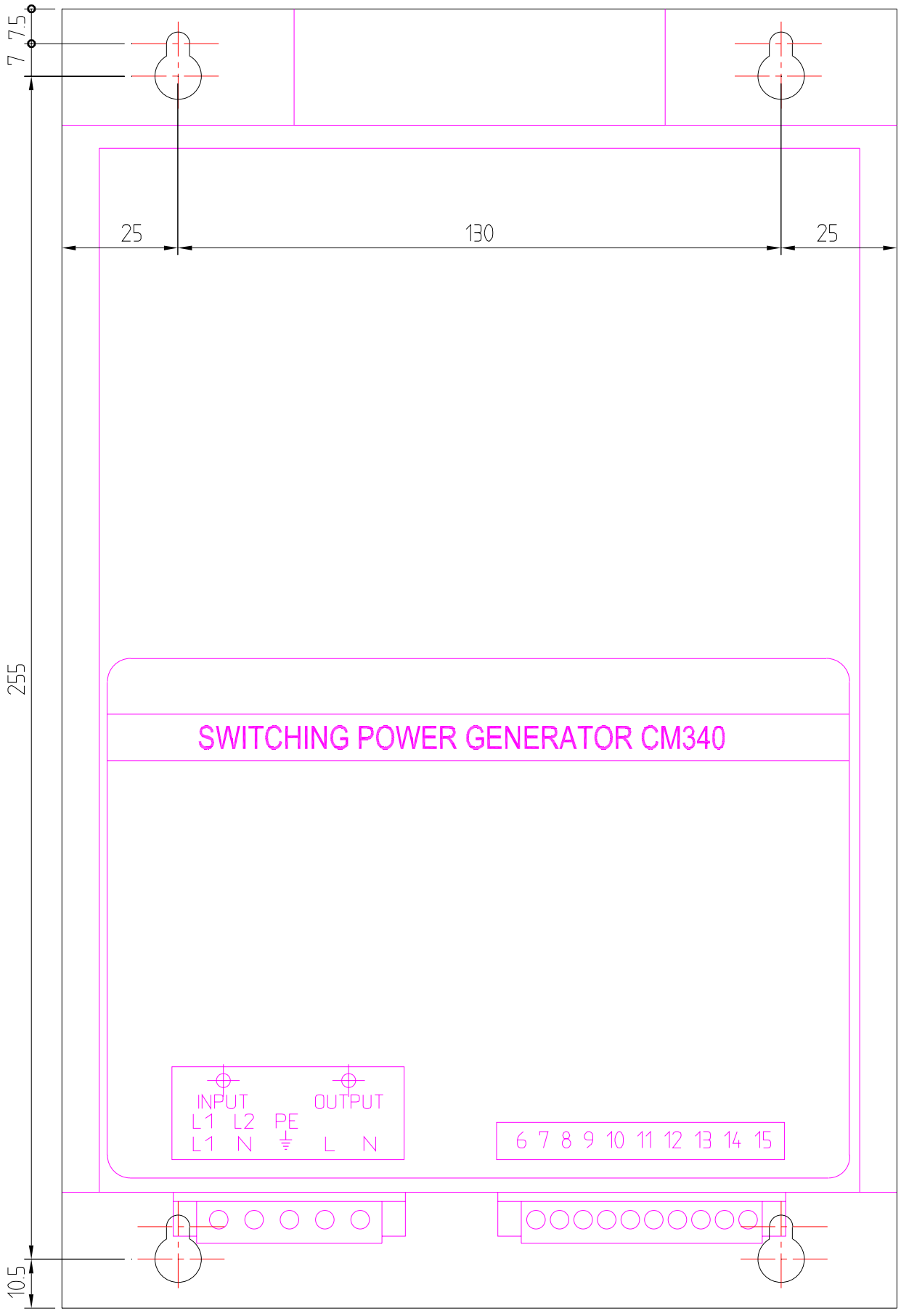
Web: www.altersystem.com


7
7.5
25
130
25
255
SWITCHING POWER GENERATOR CM340
INPUT
L1 L2 PE
L1 N
OUTPUT
L N
6 7 8 9 10 11 12 13 14 15
10.5